DOCUMENT RESUME

ED 196 916 SP 017 419

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TITLE The Effects of Reflective Teaching Relative to Promoting Attitudinal Change.
PUB DATE Apr 80
NOTE 38p.; Paper presented at the Annual Meeting of the American Educational Research Association (Boston, MA, April 7-11, 1980). For related documents, see SP 017 417-420.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Achievement; *Attitude Change; Cognitive Measurement; Conceptual Tempo; *Curriculum Evaluation; Factor Analysis; Higher Education; Hypothesis Testing; *Microteaching; *Peer Teaching; Preservice Teacher Education; Pretests Posttests; Research Methodology; *Summative Evaluation; Teacher Education Curriculum; Teaching Methods
IDENTIFIERS *Reflective Teaching

ABSTRACT

A summative evaluation was conducted at the Ohio State University during the Spring of 1979 to assess selected anticipated outcomes associated with engagement in Reflective Teaching (RT), an instructional teacher education program that features peer teaching and evaluation. Fifty-five students were exposed to Reflective Teaching while forty-six comparable students served as controls. Prior to the implementation of the RT treatment, students in both groups were administered a battery of instruments designed to measure attitudinal and cognitive change. This battery was given to all students following the experimental period. Two hypotheses were assessed. The battery of measures linked to the two apriori hypotheses were administered, four on a pretest-posttest basis and one as a posttest only measure. Data were analyzed by multivariate methods after factor analysis. Results indicated that Reflective Teaching participants were less anxious about teaching than control subjects. (JN)

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The Effects of Reflective Teaching Relative to Promoting Attitudinal Change

by

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The Ohio State University

Paper Presented at the
Annual Meeting of the American Educational Research Association

Boston, Massachusetts
April 7-11, 1980

SP 017 419

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Abstract

Two hypotheses related to suspected affective outcomes of Reflective Teaching, a new form of on-campus laboratory teaching experience, were assessed in this field experiment. Subjects (N = 101) were undergraduates enrolled in four sections of a methods course for secondary teachers. Two sections, randomly selected, were exposed to a six-hour experience with Reflective Teaching; the remaining sections served as controls. A battery of measures linked to the two a priori hypotheses were administered, four on a pre-posttest basis and one as a posttest only measure. Data was analyzed by multivariate methods after factor analysis. Reflective Teaching participants were less anxious about teaching than control subjects.

This paper is one of a series on Reflective Teaching presented at the Annual Meeting of AERA in Boston Massachusetts, 1980:

1. Williams, E.J. and Hough, J.B. "The Pre-experimental Development and Field-Testing of Reflective Teaching Lessons."

2. Nott, D.L. and Williams, E.J. "The Experimental Effects of Reflective Teaching on Preservice Teachers' Ability to Identify A Greater Number and Wider Variety of Variables Present During the Act of Teaching."

3. Holton, J.T. and Nott, D.L. "The Experimental Effects of Reflective Teaching on Preservice Teachers' Ability to Think and Talk Critically About Teaching and Learning."

4. Wilsman, M. and Kennedy, J.J. "Variations in Preservice Teachers' Modes of Reflecting About Teaching According to Their Conceptual Levels and Participation in Reflective Teaching."

The Introduction and Design Sections for these papers are similar so possibly if you have read one of these papers you will want to skip to page 7.

The Effects of Reflective Teaching Relative to Promoting Attitudinal Change

In 1972, as part of an attempt to improve a preservice education course at The Ohio State University, a decision was made to try to develop an alternative method of peer teaching to supplement microteaching, the principle form of peer teaching used at Ohio State at that time. During the years that ensued, a peer teaching strategy evolved which was more flexible and less dependent upon technical hardware than microteaching and which appeared to promote outcomes not directly addressed by microteaching. This promising alternative method of peer teaching has become known as Reflective Teaching.

A description of major features may serve to clarify the nature of Reflective Teaching. First, Reflective Teaching, like microteaching, is a small group activity. Consequently, preservice education students within a typical class are assigned to small groups containing between four and six students each. Within each group, one member is chosen to teach a short prescribed lesson to the remaining group members. Second, group members designated to teach, henceforth referred to as designated teachers, are not only assigned the same short lesson to teach, but are also given the same instructional objective or objectives to try to accomplish. The lesson structure and objectives are conveniently packaged and are called Reflective Teaching Lessons (RTLs). A third feature of Reflective Teaching is that all designated teachers implement their RTLs at the same time either in separate areas of a larger classroom or in different classrooms. Relatedly, the designated teachers are assigned a time period in which the RTL is to be taught, usually not to exceed ten or fifteen minutes. Fourth, it is made explicit that designated teachers are to strive to accomplish two general goals, the enhancement of learner achievement and learner satisfaction. Fifth, peer learners are directed not to engage in role playing during the session but rather to be themselves--to think, question, and respond as they normally would in an instructional situation. In addition, there is a measurable learner achievement and satisfaction outcome associated with each RTL. Evaluation of the teaching act and learner response to the teaching act is, therefore, not only possible but an integral part of the lesson. Finally, members comprising the total class are engaged in a common teaching and learning experience that can be used as a means to an important end, namely, intelligent reflection upon the variables that affect teaching, learning and satisfaction.

Although there is not ample research on peer teaching,[1] that which exists tends to support the value of many of the principle features incorporated into Reflective Teaching. There is, for example, a body of literature that points to the desirability of providing feedback within the context of peer instruction (Haverlock, 1969; Goldhammer, 1969; White, 1963; Armstrong and Ladd 1975; Kameen, 1975). The premise advanced by Armstrong

[1]References on peer teaching from a paper by Randy Hoover, 1980.

and Ladd (1975) that teacher trainees need to be made aware of themselves and their potential before they can begin to do the same for children is reinforced by the work of Goldhammer (1969) and White (1963) on the value of post-activity responding and analysis. This work logically appears to be served by the post-teaching reflection component of Reflective Teaching. Moreover, the potential value of peer teaching activities for both the development of teaching skills and the facilitation of teacher decision making has been recognized (Greelaw, 1960; Guetzhow, 1962; Lloyd, 1973). In addition, peer teaching represents an effort to increase the successful transfer of learning to real world application (A. Ryan, 1968), thereby providing the learner with principles he/she will utilize in parallel teaching situations (Vicek, 1965). In one of the few experimental examinations of the merits of peer teaching, Stewart (1975), examined the effect of student teachers specific verbal skills by comparing groups of student teachers with (1) instruction in "explaining", (2) "explaining" instruction as well as peer teaching, and (3) neither, and found that peer teaching experiences improved instructional skills to a significant degree when contrasted to a comparison group that had not received prior training in peer teaching. In summary, not only did the major features of Reflective Teaching appear to be intuitively sound, but for several of them support can be found in the sparce literature on peer teaching.

A summative evaluation supported by a grant from the Exxon Education Foundation was conducted at The Ohio State University during the Spring Quarter of 1979 to assess selected anticipated outcomes associated with engagement in Reflective Teaching. Briefly, fifty-five students were exposed to Reflective Teaching while forty-six comparable students served as controls. Prior to the implementation of the RT treatment, students in both groups were administered a battery of instruments designed to measure attitudinal and cognitive change. This battery was also given to all students following the experimental period.

The purpose of this report is to present findings emanating from a preliminary analysis of selected portions of pre-posttest data. Prior to launching the Reflective Teaching field experiment, a number of suspected benefits of RT, based on considerable pilot experience with RT instruction, were generated and couched in the form of directional research hypotheses. Two of the resultant hypotheses, in particular, served as the basis for the construction of pre-posttest instrumentation designed to assess attitudinal change. One hypothesis dealt directly with the affective dimension of attitude; the other with student confirmation of realized benefits of RT participation. Respectively, these hypotheses were:

1) As a result of engagement in RT, participants will:
   a) manifest a more positive disposition towards their undergraduate course-related preparation.
   b) manifest a more positive and confident disposition toward real-world teaching experience that they are scheduled to participate in the near future, i.e., short course and student teaching.
   c) manifest a more positive and realistic view of themselves as teachers.
   d) manifest a more realistic view of the role and demands of teaching.

2) As a result of engagement in RT, participants will report behavioral changes similar to those reported by former participants.

This report is primarily addressed to the formal assessment of the two hypotheses previously cited.

Method

In excess of 100 preservice teachers participated in the field experiment that was conducted at The Ohio State University during the Spring Quarter, 1979. These students were assigned by conversion computer scheduling to four sections of Ed F&R 435, a general methods class required for secondary education majors at The Ohio State University. Two of the four intact sections of Ed F&R 435, with a combined enrollment of fifty-five students, were randomly designated as treatment sections. Students enrolled in these two sections were exposed to six hours of training using Reflective Teaching Lessons (RTLs). Forty-six undergraduate students, enrolled in the remaining two sections of the same course did not participate in Reflective Teaching activities. These two sections were designated control sections.

Prior to the implementation of the Reflective Teaching (RT) activities, participating students in both treatment and control conditions were administered a battery of locally prepared instruments designed to measure anticipated attitudinal and cognitive changes resulting from exposure to Reflective Teaching. This battery, augmented by several additional instruments, was also administered to all participating students subsequent to the three-week experimental period. Consequently, a two-group pretest-posttest design, with partial use of random assignment, served as the generic arrangement underlying the design of this evaluation.

Procedures

As previously mentioned, two distinct major groupings of undergraduate students (treatment vs. control), all of whom were enrolled in Ed F&R 435: Theory and Practice in Secondary Education, served as participants in this field experiment. Also mentioned was the fact that the course, Ed F&R 435, was taught in four sections during the Spring Quarter, 1979. Moreover, two of the sections, randomly determined, received a total of six hours of exposure to Reflective Teaching while the remaining two sections were exposed to an alternate activity to be described. Four instructors, three Reflective Teaching staff members and another graduate teaching assistant who had previous experience with and knowledge of Reflective Teaching, were randomly assigned to the four sections of ED F&R 435 to replace the college instructor during the experimental activity.

Within the four sections, random assignment was used to partition students into four or five groups. An attempt was made to structure each group such that it consisted of six students, hence to accomodate larger sections, five groups were formed. Groups remained intact for the duration of the experimental activity which took place in three two-hour class periods

on three consecutive Thursdays.

Reflective teaching activities. Treatment group activities consisted of two different RTLs being taught each of the three consecutive Thursdays. Within each of the randomly structured RT groups, students were each assigned at random a specific RTL to teach. The specific RTLs used, in order of their presentation, were: (a) Dewey, (b) Origami, (c) Good Teacher, (d) Magic Squares, (e) Time, and (f) Castle Tasks. For each RTL, the recommended format of a complete RTL was observed, i.e.,

1. 10-15 minutes of instruction by each designated teacher,
2. 5 minutes for completion of testing and/or learner satisfaction forms,
3. 15 minutes for within-group or small group discussion of the instruction, and
4. 15 minutes for large or between group discussion/instruction.

This process, taking about fifty minutes, took place twice each Thursday.

Control group activites. Relative to the two sections that served as controls, procedures used to structure groups within treatment sections were replicated. However, the nine groupings of control subjects were provided with a curriculum materials packet designed specifically as a control activity for this experiment. The packet was entitled, "Teaching: The Roots of Our Profession 1800-1918," and was developed by John T. Holton, a Reflective Teaching staff member. Briefly, the packet contained copies of original documents which related to what teaching was like during the formative years of the American teaching profession. These materials were examined by control students within the context of their small groups and subsequent to examination served as the basis for discussions (small group followed by large group discussion) dealing with certification and professionalism. Our intent with respect to the control group experience was to duplicate the design structure of the treatment condition, however, instead of exposure to RTLs, control students received a substantively meaningful learning activity that on the surface appeared not to promote the objectives of RT.

Sample

A comparison of the fifty-five students comprising the treatment condition with the 46 students who participated in control activities revealed (as expected) few differences with respect to gathered informational variables. Within both conditions, the largest group of students (38%) were 21 years old, with the range for the control condition being 20 to 37 years and 19 to 32 years for the RT groups. Other between condition similarities were: (a) most students were juniors in their undergraduate program (53% of RT group and 62% of the control group),

(b) most students in each group had a GPA (grade-point-average) between 2.5 and 3.0 from a 4-point scale, (c) most students had completed their Freshman Education Experience (FEEP) and Educational Psychology 230 as previous education courses/requirements. In addition, more than 50% of the students in each condition had not had experience with camp teaching, church teaching, tutoring, substitute teaching, or regular teaching. Differences were observed, however, in the sexual composition and areas of specialization between conditions. More specifically, the control condition had a somewhat higher percentage of females (57%) than males (43%), while the reverse was true for RT sections (60% males, 40% females). Moreover, the largest number of control students were secondary Physical Education majors (32%) with the areas of Art and Distributive Education each having 11%; whereas the distribution of major areas for most RT students was bimodal--either English or Social Studies majors (18% each) with Art and Physical Education very close behind. Hence, to the extent to which sex and area of specialization may be correlated with the outcome measures gleaned in this study, the internal validity of this experiment is attenuated.

Evaluation Design

The design structure, employed to evaluate the extent to which RTLs appear to achieve their purported objectives, was essentially a classical two-group pretest-posttest control group design augmented with two nested variables, namely, (a) sections of ED F&R 435 and (b) RT groups (subgroups consisting of approximately five students within sections of Ed F&R 435). The principal variable consisted of two levels: (a) exposure to the six-hour RT experience (the treatment condition) and (b) non-exposure to RT (the control condition). And as previously noted, two intact sections of Ed F&R 435 were randomly assigned to each of the two levels of the principal variable. Consequently, the second variable incorporated into the general design was Sections, two of which were nested in the RT condition and two nested within the control condition.

Since Reflective Teaching is at least initially a small group activity, Sections were partitioned into at least four groups made up of five to six randomly assigned students per group. Groups, therefore, constituted an additional nested variable, at least four of which were nested within each of the two levels of the Section factor. Finally, the pretest and posttest information provided by participating students was treated as a within-subjects variable (i.e., a repeated measurement) and subsequently built into the overall design structure.

In sum, the design arrangement which governed the data collection may be labeled a partial hierarchical design with repeated measurements. (see Kennedy 1977, pp. 538-551). Below is a listing and brief description of the design variables just noted.

1. Treatment (T_j where j = 1,2.):

   a) T_1 = exposure to Reflective Teaching

   b) T_2 = exposure to control activities

2. Sections (S_k where k = 1,2.):

   a) two sections randomly assigned to T_1, the RT condition.

   b) two remaining sections assigned to T_2, the control condition.

3. Groups (G_m where m = 1, 2, ..., 6):

   a) six RT groups randomly structured within S_1 of T_1

   b) four RT groups randomly structured with S_2 of T_1

   c) four control groups randomiy structured with S_1 of T_2

   d) five control groups randomly structured within S_2 of T_2

4. Pre-posttesting (P_o where o = 1, 2.):

   a) P_1 = pretest measures, a variety of attitudinal and cognitive subtests designed to measure RT outcomes.

   b) P_2 = posttest measures, the same subtests administered prior to the experiment with the addition of several posttest-only measures.

5. Subjects (S_i where i = 1, 2, ... n):

   a) a total of 55 students arranged into 10 groups who participated in the RT treatment condition.

   b) a total of 46 students arranged into 9 groups who did not participate in the RT treatment, but instead were exposed to alternate control experiences described previously.

In addition to the aforementioned variables, the two RT groups within each of the two sections that received the Reflective Teaching treatment were randomly identified for videotaping of RT activities. At this writing, comparisons involving this within-treatment factor have not been made.

In an attempt to clarify the layout of the generic design arrangement, Figure 1 is provided. It should be noted, however, that to enhance clarity and conserve space, the pre-posttesting repeated measurements variable has been omitted.

Treatment Conditions	Sections Within Treatment	Groups Within Sections: Video Taping	Groups Within Sections: No Video Taping
Treatment: Students exposed to RTL	Section 1	Group 1 (n=6)	Group 3 (n=5)
			Group 4 (n=5)
		Group 2 (n=6)	Group 5 (n=5)
			Group 6 (n=5)
	Section 2	Group 1 (n=6)	Group 3 (n=5)
		Group 2 (n=6)	Group 4 (n=6)
Control: Students exposed to an alternative activity	Section 1	Group 1 (n=5)	Group 3 (n=5)
		Group 2 (n=5)	Group 4 (n=5)
	Section 2	Group 1 (n=6)	Group 3 (n=5)
			Group 4 (n=5)
		Group 2 (n=5)	Group 5 (n=5)

Figure 1. Layout of generic design structure for the RTL field experiment minus the inclusion of the pre-posttesting variable.

Instrumentation

Six distinct instruments were developed by RT personnel and were administered to all 101 participating students on a pretest and posttest basis for the purpose of assessing anticipated outcomes of RT instruction. Demographic data and data pertaining to a specialized interest, the conceptual level of participating students (Hunt, et. al., 1978), were obtained from all students at the time of pretesting only. A ninth measure was designed to assess student attitude toward the course in which the experiment was conducted (i.e., Ed F&R 435), but this instrument was administered only as a posttest. Finally, two additional instruments were administered exclusively to the RT group on a posttest basis only. This battery of instruments was administered during the first and fifth week of the quarter, that is, the pretest was given on the Thursday prior to the experiment while the posttest was administered on the Tuesday after the final treatment, taking about an hour and a half each time. The battery was administered, employing a standardized process for the pre- and posttest, by RT and control instructors at 8:00, 10:00, and 2:00, with all the students from the two 10:00 sections (one RT and one control) in the same room during the pretest. RT and control groups were separated for posttesting since the RT participants were given two additional instruments. An overview of all the instruments are given below, however, only those designed to assess attitude (Attitude Toward Teaching, Belief About Outcomes, Me As A Teacher, Practice Teaching, and Education F&R 435) are addressed in this report. The ensuing paragraphs briefly describe the development and nature of these instruments contained within the battery.

Information form. From participants, information was gathered pertaining to their age, sex, major in education, previous education course-work completed, approximate grade point average (GPA), approximate university standing, previous teaching experience, and amount of previous teaching experience.

Conceptual level stems (CL). This paragraph completion pretest instrument, developed by Hunt (1978), consisted of six topics to assess Conceptual Level, i.e., how a person thinks. RT and control group respondents were allowed two minutes per topic and asked to write at least three sentences on each topic. The topics were: (a) What I think about rules..., (b) When I am criticized..., (c) What I think about parents..., (d) When someone does not agree with me..., (e) When I am not sure...and, (f) When I am told what to do.

Teaching/learning stems. This pre-posttest instrument contained two sentence completions: "When I think about teaching...", and "When I think about learning...". Each participant in the control and experimental sections was asked to complete each statement and add three sentences to it within a two-minute time period. These two stems were added for two reasons: (a) to collect data on teaching and learning, and (b) to link with and add relevance to the stems for assessing conceptual levels.

Attitudes toward teaching (ATT). This was a Likert attitude scale and consisted of 21 attitude statements to which students were requested to indicate their degree of agreement or disagreement on a six-point response scale (strongly agree to strongly disagree). RT project personnel initially generated a number of statements that they believed possessed the capacity to measure students' attitudes in the areas of: (a) the contemporary status of the teaching profession in general, (b) the personal and educational requisite for successful teaching, (c) the demands and problems typically confronted by teachers, (d) the value of undergraduate teacher preparation programs, and (e) the rewards or benefits to be drived from teaching. The initial item pool contained 43 attitude statements of which approximately half were stated in a positive fashion while the remaining were stated negatively. These items were administered to a field-trial sample of 98 undergraduate students in teacher education--not students participating in the field experiment--and later subjected to a conventional item analysis for the purpose of identifying the items within each of the aforementioned areas that discriminated best. Identified items, 21 in number, constituted the ATT instrument which, as mentioned, was administered to both the treatment and control students as a pretest and posttest. Three typical statements contained on the ATT are presented below for purposes of illustration.

		Strongly Agree					Strongly Disagree
1.	Teaching is not as easy as it looks.	1	2	3	4	5	6
6.	Teaching is one of the most important activities in our society.	1	2	3	4	5	6

		I Strongly Agree					I Strongly Disagree
15.	Education courses require busy work that is of little value.	1	2	3	4	5	6

Belief about outcomes (BAO). This instrument consisted of 33 statements to which participating students were also requested to indicate their degree of agreement on a six-point interval-appearing scale. Statement contents were based on diaries (or logs) kept by approximately 75 students majoring in elementary education during a preservice methods course in which they were exposed to Reflective Teaching. Students' diaries were examined for comments reflecting perceived benefits or outcomes or working with RTLs. Comments pertaining directly to the Reflective Teaching experience were compiled, edited and subsequently incorporated into the BAO instrument. The BAO instrument was prefaced by the phrase "I believe." Edited statements of perceived outcome derived from student diaries and the six-point bipolar scale of agreement followed. Representative examples of BAO items are:

I believe...	I Strongly Agree					I Strongly Disagree
2. I have difficulty explaining my feelings about teaching.	1	2	3	4	5	6
11. I will have difficulty bringing about learner achievement.	1	2	3	4	5	6
33. I will adjust my objectives and methods to situations that arise in my class.	1	2	3	4	5	6

Me as a Teacher (MT). This instrument was essentially a semantic differential (See Osgood, Suci, Tannebaum, 1957), which was created to measure pre-posttest change on several dimensions of the participants teaching self-concept. This semantic differential presented the concept "Me As A Teacher" at the top of a page followed by fifteen bipolar adjective scales spanning a variety of concerns related to one's concept of self as teacher. Below are several representative scales which appeared on the MT semantic differential.

ME AS A TEACHER

	1	2	3	4	5	6	
Secure	:	:	:	:	:	:	: Insecure
Inflexible	:	:	:	:	:	:	: Flexible
Experienced	:	:	:	:	:	:	: Inexperienced

Practice Teaching (PT). This semantic differential was developed specifically to measure hypothesized change in students' views of the traditional practice or student teaching requirement, a requirement confronting all study participants in their immediate future. An abbreviated version of this instrument which contained ten bipolar adjective scales is depicted below.

PRACTICE TEACHING

	1	2	3	4	5	6	
Important	:	:	:	:	:	:	: Unimportant
Anxious about	:	:	:	:	:	:	: Not anxious about
Hard	:	:	:	:	:	:	: Easy

Education F&R 435 (ED 435). A third semantic differential consisting of fourteen scales was produced to measure specific attitudes toward the course in which the RT experiment was conducted (i.e., Ed F&R 435). Since the battery of pretest instruments was administered during the first week of the course in question, this particular semantic differential was not included in this battery. It was, however, a component of the posttest given during the fifth week of the ten-week quarter. This instrument was structured to detect possible shifts in opinion about the worth of Education F&R 435 as a result of participating--or not participating--in the RT component of the course.

EDUCATION F&R 435

Relevant	:	:	:	:	:	:	: Irrelevant
Difficult	:	:	:	:	:	:	: Easy
Interesting	:	:	:	:	:	:	: Boring

Analysis of a teaching episode. This pre-posttest instrument consisted of students viewing a short (10-15 minute) teaching episode and then listing "the things they saw that might have contributed to or detracted from learning." For as many of these items as possible they were asked to list "why or in what way it contributed to or detracted from learning."

As a result of RT. This posttest only instrument consisted of 34 statements to which RT participants were requested to indicate their degree of agreement on a six-point interval appearing scale. Statement contents were based on hoped for results of RT. The instrument was prefaced by the phrase "As a result of your six hour experience with Reflective Teaching:". Representative examples of items are:

	I Strongly Believe			I Strongly Do Not Believe		
5. ...do you believe you know more about how others react to your teaching?	1	2	3	4	5	6
24. ...do you believe RT permitted you to try-out your teaching style?	1	2	3	4	5	6

Course description. For this instrument which was open-ended RT participants were asked to respond to a statement concerning what they would tell another student who would be doing RT at a later date.

As previously stated, this report will only address those instruments designed to assess the two hypotheses cited earlier.

Data Reduction

As a review of the section on instrumentation reveals, in total there were in excess of ninety specific items on the instruments administered to students on both a pretest and posttest basis and an additional fourteen specific items on the ED F&R 435 semantic differential which was given as a posttest only. The large number of items mitigated against item by item comparison of treatment and control group performance, therefore, each instrument was subjected to a classical factor analysis for the purpose of identifying "clusters" of items measuring the same dimensions or factors. Pretest and posttest results for each instrument were subjected to a separate factor analysis.

Briefly, the inter-item correlational matrices for each test were subjected to a principal-axis rotation subsequent to placing squared multiple correlations in the principal diagonal as initial estimates of communalities. These results were used to determine the number of salient factors (i.e., the rank of the correlation matrix) to retain for further rotation. The principal methods used to determine the number of salient factors were Cattell's scree test (Cattell, 1966, pp. 174-243) and an examination of the initial principal-axis matrix which was over-factored. (In cases where the number of salient factors were in doubt, competing solutions were taken to oblique promax rotation and a final decision was achieved on the basis of the meaningfulness of the resultant factor structure.) The second step, undertaken to obtain greater precision, consisted of refactoring the principal-axis matrix using the sum of squared salient factor loading as estimates of effective communalities. Finally factors were rotated obliquely by the promax method to enhance the meaningfulness of the structure (see Hendrickson & White, 1964).

Presented below is an overview of the number of salient factors for each analysis. At this writing, a substantial number of factors have yet to be substantively interpreted. Also, specific items belonging to each resultant factor all attained a factor loading of at least .25.

Attitudes Towards Teaching (ATT)

Pretest

Factor I - "Teaching Activity"
Items: 8, 7, 2, 10, 12 and 3.

Factor II - "Teacher Education Programs"
Items: 20, 14, 15, 13, 11, and 9.

Factor III - "Requisite for Teaching"
Items: 18, 19, 17, 21, and 16.

Factor IV - "The Demands of Teaching"
Items: 1, 19, 18, 3, 9, 11 and 12.

Note: Items 4, 5, and 6 did not achieve a loading greater than .25 on any of the four factors above.

Posttest

Factor I - "Teaching Activity"
Items: 8, 7, 9, 2, 4, 6, 10 and 3.

Factor II - "Teacher Education Programs"
Items: 20, 14, 13, 15, and 11.

Factor III - "Requisite for Teaching"
Items: 18, 19, 17, 15, 16 and 6

Factor IV - "The Demands of Teaching"
Items: 1, 3, 4, 13 and 12.

Note: Items 5 and 21 did not achieve a loading greater than .25 on any of the four factors above.

Belief About Outcomes (BAO)

Pretest

Factor I - "Teaching and Learners"
Items: 28, 22, 19, 10, 17, 25, 18, 33, and 32.

Factor II - "Teaching and Myself"
Items: 12, 20, 6, 11, 21, 5, 1 and 9.

Factor III - "Teaching Effectiveness"
Items: 7, 8, 17, 26, 18, 33, 32, 27, 16, 3, 15, 25, 30, 14, 19, 4, 24, 11 and 31.

Factor IV - "Difficulties and Student Learning"
Items: 1, 2, 28, 14, 13, 30, 23, 22 and 27.

Note: Item 29 did not achieve a loading greater than .25 on any of the four factors above.

Posttest

Factor I - "Teaching and Learners"
Items: 18, 17, 16, 30, 25, 32, 33, 23, 14, 31, 19, 26, 27, 10, 22 and 4.

Factor II - "Teaching and Myself"
Items: 1, 2, 20, 12, 6 and 5.

Factor III - "Teaching Effectiveness"
Items: 8, 7, 5, 9, 4, 10, 21, 3, 33, 30 and 24.

Factor IV - "Difficulties and Student Learning"
Items: 11, 13, 14, 3, 21, and 12.

Note: Items 15, 28, and 29 did not achieve a loading greater than .25 on any of the four factors above.

Me As A Teacher (MT)

Pretest

Factor I - "Feelings About Self"
Items: 1, 9, 7 and 15.

Factor II - "Commitment"
Items: 13, 2, 5, 11, 12, 15.

Factor III - "Characteristics of Person"
Items: 4, 6, 3, 7 and 10

Note: Items 8 and 14 did not achieve a loading greater than .25 on any of the three factors above

Posttest

Factor I - "Feelings About Self"
Items: 15, 14, 10, 9, 13, 1 and 6.

Factor II - Commitment"
Items: 5, 2, 13 and 3.

Factor III - "Characteristics of Person"
Items: 7, 8, 1 and 3

Note: Items 4, 11 and 12 did not achieve a loading greater than .25 on an, of the three factors above.

Practice Teaching (PT)

Pretest

Factor I - "Difficulties"
Items: 2, 4, 5, 9 and 13.

Factor II - Concerns About"
Items: 6, 3, 8 and 15.

Factor III - "Importance of"
Items: 7, 1 and 8.

Note: Item 10 did not achieve a loading greater than .25 on any of the three factors above.

Posttest

Factor I - "Concerns About"
Items: 6, 3, 8, 2 and 5.

Factor II - "Difficulties"
Items: 2, 5, 9, 3, 4 and 8.

Factor III - "Importance of"
Items: 7, 1 and 4.

Note: Item 10 did not achieve a loading greater than .25 on any of the three factors above.

Education F&R 435 (Ed 435)

Posttest

Factor I - "Value of"
Items: 9, 10, 6, 12, 8, 3, 14 and 5.

Factor II - "Complexity of"
Items: 7 and 11.

Factor III - "Structural Value of Content"
Items: 13, 2 and 1.

Note: Item 4 did not achieve a loading greater than .25 on any of the three factors above.

An Overview of the Analysis

Items within the clusters produced by the factor analyses were treated as intact data sets and analyzed initially by a three-principal-factor mixed-model multi-variate analysis of variance (MANOVA) to determine if there was a basis for suspecting significant differential performance between the RT treatment and the control groups. The three principal factors which defined the majority of the MANOVAs were:

1) Treatment - RT group vs control,
2) Groups - nine groups nested within each level of the Treatment variables, and
3) Testing - pretests vs posttests.

The Treatment and the Testing variable, each consisting of two levels, were fixed; the nested variable Groups, however, were treated as a random variable. The Section variable, discussed in the overall design structure, was not incorporated in the MANOVAs; its inclusion would prevent the calculation of the multivariate F statistic (Roa's F test approximation of Wilks' lambda) for the interaction between Treatment and Testing due to an insufficiency in error degrees of freedom for the F test in question. Failure to incorporate Sections as a variable in the MANOVAs, however, neither biased tests of significance nor failed to control Section effects since, to the extent to which these effects were present, they simply contributed to greater variability among Groups within Sections hence, inflating the error term of the F statistic for the crucial Treatment by Testing source of variation.

The multiple dependent variables, subjected to analysis, were items with respectable loadings on factors which emerged from the data reduction process. MANOVAs which produced a significant result (at the .05 level) for the interaction between Treatment and Testing, suggesting there might be differences between the RT group and the control group, were analyzed further by examining respective univariate analysis of variance (ANOVA) results, applying tests on simple main effects for the Treatment variable at levels of the Testing variable where appropriate.

Due to the software requirements, to perform MANOVA it became necessary to eliminate one RT group. Moreover, one subject from each of four RT groups and one control subject were randomly eliminated to achieve complete balance, leaving nine RT groups and nine control groups each having five subjects.

Results

As noted, separate MANOVAs were performed on sets of items that on the basis of factor analytic results appeared to be measuring the same factor or unitary dimension. Relative to the four instruments that were administered both as a pretest and posttest, only items that manifested factor loadings in excess of .25 on both the same pretest and posttest factor were incorporated into data sets that were analyzed. A number of items failed to achieve this criterion and have at this writing not been subjected to analysis.

Analysis of ATT Data

Recall that the resultant factor structure associated with this attitude scale consisted of four similar factors for both testing periods. Four MANOVAs, therefore, were performed on these data. Table 1 contains not only a summary of the overall multivariate results, but also presents (a) univariate tests of the Treatment by Testing interactions for each of the five items, (b) respective pretest and posttest loadings on Factor I, and (c) respective t test values for comparison between the average performances of the RT and control groups at both testing times. Examination of Table 1 reveals the multivariate F test was not significant, F (5, 12) = 1.16, $p < .38$. This indicates that when the five items are considered simultaneously, there is no basis for rejecting the null hypothesis of absence of interaction between Treatment and Testing. Hence, even if subsequent univariate tests should suggest greater change on a given item for the RT group, such a finding must be interpreted with utmost caution. But, as Table 1 discloses, there is also a complete absence of significance at the .05 level for the five univariate F tests. In sum, evidence is insufficient to conclude that students exposed to RTLs demonstrated a greater shift in attitude than the control group students as measured by the five items comprising Factor I.

Insert Table 1 about here

With respect to analysis (table not shown), the multivariate F test for the relevant interaction for the items of Factor II from the ATT did not turn out to be significant, F (5, 12) = 0.17, $p < 0.97$. Moreover, all five univariate F's failed to achieve significance. Clearly, there is no justification to suspect that RT and control students responded differently to the five items comprising the cluster.

When the four items falling under Factor III were subjected to a MANOVA (table not shown), the multivariate F fell short of the level of significance established for this research, F (4, 13) = 0.70, $p < 0.61$, as did all the ANOVAs. Thus, a difference between RT and control group response to the four items in this cluster cannot be documented.

A similar outcome must be reported relative to the analysis of the three items of Factor IV (table not shown) for again the overall and univariate F all failed to be significant.

In conclusion, substantiation of the first hypothesis presented earlier in this report has not been realized. To the extent to which the ATT instrument measures validly the dimensions of attitudes reflected by the factors previously described, the performed and described analyses all failed to support this hypothesis.

Analysis of BAO Data

The composition of the BAO instrument is linked to the second major hypothesis stated on page 3--the hypothesis which predicts that RT students in comparison to control group students, will report behavioral changes similar to those reported by former RT participants. Recall that the factor analysis of the BAO pretest and the analysis of the BAO posttest each produced a four factor solution. As before, items comprising the clusters that appeared at both testing periods were subjected to four MANOVAs. The results for Factor I, described in Table 2, show no significance for the multivariate test of the Treatment by Testing interaction, i.e., F (8,9) = .95, p<.52. Strong evidence, therefore, is not present to suggest that the responses of students to these items in the RT treatment group differ from the responses provided by students in the control condition.

Insert Table 2 about here

A further examination of univariate results showed that only one interaction was significant, namely the interaction associated with the item "Teaching is simple," since F (1,16) = 4.70, p<.05. A follow-up of this interaction using Dunn's procedure (see Kennedy, 1978, pp. 195-99) revealed that the difference between the RT group mean at pretest (4.29) and the control group mean at pretest (5.36) did not exceed the minimum distance criterion of .252; hence, the null hypothesis of no difference between groups at this testing period is retained. However, for posttest means, RT students produced a significantly lower average (5.07) than did control students (5.44). On this particular item, the RT Group felt that teaching is not as simple as they had though prior to engagement in Reflective Teaching.

Examination of Factor II items from the BAO as displayed in Table 3 again reveals no significance for the multivariate results, F (4, 13) = 1.87, p<0.18. However, further study of the univariate results disclosed that one interaction was significant, that associated with the item "I do not know the demand and difficulties of teaching," F (1, 16) = 4.94; p<.04. Follow-up of this interaction, again using Dunn's procedure, revealed no difference between groups at each testing period.

Insert Table 3 about here

For the seven BAO items in Factor III (table not shown) no significant difference for both the multivariate results, F (7, 10) = 1.73, p<0.21, and the subsequent univariate F results between the RT group and the control group was demonstrated.

Similarly, both items in Factor IV (table not shown) fail to achieve statistical significance for the multivariate F test, F (2, 15) = 0.42, $p<0.66$, and the univariate tests.

In sum, the analysis of item-clusters for the BAO instrument produced little evidence to support the second hypothesis on pages 3-4. With the possible exception of the item "Teaching is simple," evidence is not available to indicate that subjects who engaged in RT activities reported greater change than control group subjects on an instrument containing reported behavioral changes by former participants.

Analysis of MT Data

The semantic differential MT was designed to measure subpoint c of hypothesis 1--after engaging in RT participants will manifest a more positive and realistic view of themselves as teachers. The factor analysis of this instrument resulted in three factors.

The multivariate F test from analysis of Factor I (table not shown) for the relevant interaction fell far short of being significant, F (3, 14) = 0.33, $p<0.81$. All the ANOVAs performed on these items did not attain statistical significance, consequently, a difference between the RT and control group response to these three items in this cluster cannot be documented.

When the Factor II items of MT (see Table 4) were subjected to MANOVA, again the multivariate F was not statistically significant, F (3, 14) = 1.98, $p<0.16$. However, the third item, "not involved... Involved," in the cluster had a significant univariate interaction, F (1, 16) = 4.72, $p<.03$. A follow-up using Dunn's procedure revealed no difference between RT and control groups for both testing periods.

Insert Table 4 about here

Non-significant interaction must be reported for the multivariate analysis of the two items of Factor III, F (2, 15) = 0.05, $p<0.95$ (table not shown). All univariate F tests were also non-significant.

In conclusion, confirmation of part c of hypothesis 1 on pages 3-4 has not been realized. To the extent that the MT instrument validly measures that the RT participants manifested a more positive and realistic view of themselves as teachers, almost all the analyses failed to support the hypothesis. The exception was shown by univariate significance for the item "not involved...involved," however, Dunn's procedure demonstrated that the pretest and posttest mean differences for the RT and control group were not significant. Consequently, this one item is not enough support for one to state that RT activities caused students to be more positive and realistic in their views of themselves as teachers.

Analysis of PT Data

Three factors were generated for the semantic differential PT. This semantic differential was designed to measure part b of hypothesis 1: those students engaged in RT will manifest a more positive and confident disposition toward real-world teaching experiences that they will participate in in the near future.

Table 5 reveals that the multivariate F test for the three items in Factor I in PT was statistically significant, F (3, 14) = 4.19, $p<.03$. A more detailed examination of this factor and the significant multivariate interaction, therefore, was justified.

Insert Table 5 about here

First, the factor in question clearly reflects concern about this eminent program requirement. Recall that this factor has been tentatively labeled "Concerns about practice teaching." Secondly, an examination of the three univariate F's clearly suggested that the significant interaction was promoted by item 8 (anxious about...not anxious about). Applying simple-effects tests among levels of the treatment variable at the time of pretesting and independently at the time of posttesting for the significant univariate F associated with item 8 showed that whereas there was no difference among treatment conditions at pretest (RT group = 2.78, control group = 2.53), a marked and significant difference was observed at the time of posttesting, i.e., the RT group posttest average of 3.38 exceeded that of 2.29, the posttest mean of the control group. Specifically, students involved with Reflective Teaching responded that they were less anxious about practice teaching. And in general, there is some evidence in support of the contention that RT group members were concerned less about practice teaching.

For the three items in the second cluster in PT (table not shown), it must again be reported that the multivariate F, F (3, 14) = 1.67, $p<0.22$) and the univariate F tests failed to achieve significance. Consequently, these items present no justification for thinking that RT and control group students responded differently to the items that reflect the difficulties of teaching.

The analysis of Factor III from PT displayed by Table 6. Again the multivariate F test for the relevant interaction did not turn out to be significant, F (2, 15) = 2.63, $p<0.11$. Item two in this group, "valuable... useless," did show significance for the univariate F test (F (1, 16) = 4.56, $p<0.05$). However, follow-up using Dunn's procedure did not show significant differences between either the pretest means. Hence, the null hypotheses of no difference were retained.

Insert Table 6 about here

In summary, the PT semantic differential demonstrated the greatest support for part b of hypothesis 1, i.e., RT participants will manifest a more positive and confident disposition toward real-world teaching experience that they are scheduled to participate in in the near future. Support was shown by significant multivariate results for "Concerns About Practice Teaching" (Factor I) with significant univariate follow-up results for item 3 (Anxious about...not anxious about). Less anxiety about the practice teaching experience was expressed and statistically supported for the RT members after their experience with RTLs when their responses were compared with control group members.

Analysis of Ed. 435 Data

This posttest was devised to assess the RT participants' disposition toward their undergraduate course-related preparation--hypothesis 1 subpart a. The eight items in Factor I of the three factors produced by Ed. 435 did not achieve significance for both the multivariate F test (F (8, 9) = 0.70, p<0.69) and the univariate tests (table not shown).

Similarly, multivariate F tests for Factor II of Ed. 435 (table not shown) fell short of achieving statistical significance for this research F (2, 15) = 0.54, p<0.59. Both ANOVAs were far from attaining significance also.

Likewise, outcomes relative to the analysis of the three items of Factor III for the overall and univariate F tests (table not shown) failed to be significant.

In conclusion, the analyses of the three clusters of items on the posttest-only semantic differential dealing with dispositions towards Ed. F&R 435 failed to indicate that RT and control group subjects were differently disposed.

Discussion

A portion of the summative evaluation of the Exxon Reflective Teaching Project examined attitudinal measures and the purpose of this report was to describe initial findings relative to two hypotheses concerning attitudinal change. Specifically, the hypotheses entertained in this report were:

1) As a result of engagement in RT participants will:

   a) manifest a more positive disposition towards their undergraduate course-related preparation.

   b) manifest a more positive and confident disposition toward real-world teaching experience that they are scheduled to participate in in the near future, i.e., short course and student teaching.

   c) manifest a more positive and realistic view of themselves as teachers.

d) manifest a more realistic view of the role and demands of teaching.

2) As a result of engagement in RT, participants will report behavioral changes similar to those reported by former participants.

To assess these hypotheses, a number of attitudinal instruments were administered during the conducting of a field experiment described herein. Unfortunately, the initial analysis of resultant data failed to totally support the two hypotheses advanced.

There was however, some evidence suggesting that RT participants viewed teaching as a more complex task subsequent to their exposure to Reflective Teaching. A measure of evidence in support of positive change due to Reflective Teaching was seen in student responses to a semantic differential specifying "practice teaching" as a concept. On a cluster of specific responses to this semantic differential, responses reflecting personal concern about this activity, RT group members reported less anxiety than did control group members at the end of the experimental period. At the very least Reflective Teaching appears to reduce traditional undergraduate worries and concerns about this impending activity. Additional support for these results were gleaned from statements made by students during the videotaped RT sessions:

"Confidence was greatly increased."

"...I think one of the main problems of new teachers is first getting over the stage frightening experience. I think RT helped me somewhat with that."

"...You'll get a chance to try your teaching method and feel out your strengths and weaknesses."

In addition, on a posttest-only basis each RT participant was asked to register his/her belief/disbelief about 34 statements about Reflective Teaching. Each statement was the completion of the following stem: "As a result of your six hour experience with Reflective Teaching, to what extent do you believe you...". Several of the completions seem germane to the attitudes and beliefs of the experimental subjects:

60% believed their ideas about teaching and learning had changed,
73% believed they had more positive attitudes toward themselves as teachers,
65% valued RT when compared with other activities in methods classes,
84% believed they felt more positively towards themselves as teachers, and
69% believed RT helped them find out more about themselves as teachers.

Therefore, there is reason to suspect that if RT were implemented more fully, rather than having only 6 hours of RT out of 80 total in-class hours, better substantiation would be found for these hypotheses. Moreover, the present inability to document positive change over a wide spectrum of hypothesized outcomes may well be due to: the limited student involvement with RT, as previously mentioned; participants not taking the test seriously, i.e., some were observed to be less interested in the posttest than the pretest; RT students were videotaped in a studio--a strange environment--on the other end of campus; the fact that attitudes are difficult to change; and RT is a strongly cognitive treatment rather than one that will show immediate changes in attitudes. In sum, these investigators believe that the present inability to document favorable change due to experience with RTLs is largely due to the aforementioned events.

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Table 1

Attitudes Toward Teaching

MANOVA ON ATTITUDE SS AS UNIT (NO SEC)-ELIMINATE EXP2 GP1, EXP1GP3S3, EXP1GP5S6,EXP2GP2S6,EXP2GP3S6,CON2GP1S6.
Factor 1: 2, 3, 7, 8, 10 FROM 5 FACTOR SOLUTION/4 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 through 1	1.159	5.000	12.000	0.384	0.571

		factor loadings		t-test			
		pretest	posttest	pretest	posttest	F	p-level
2.	An effective teacher should use a variety of ways to accomplish the same task.	.550	.549	5.31	5.31	0.681	0.421
3.	Teaching is a demanding activity.	.338	.371	5.41	5.36	2.365	0.144
7.	Teachers are helped when they get feedback about their performances.	.553	.619	5.61	5.54	0.085	0.774
8.	Successful teachers tend to be flexible.	.717	.765	5.44	5.51	0.332	0.573
10.	Learning to teach should involve practice.	.472	.395	5.64	5.54	0.503	0.489

Table 2

Belief About Outcomes

MANOVA ON I BELIEVE SS AS UNIT (NO SEC)-ELIMINATE EXP2 GP1,
EXP1GP3S6,EXP1GP5S6,EXP2GP2S6,EXP2GP3S6,CON2GP1S6
FACTOR 1:10,17,18,19,22,25,32,33 FROM 4 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 through 1	0.950	8.000	9.000	0.524	0.677

		factor loadings		t-test			
		pretest	posttest	pretest	posttest	F	p-level
10.	I will be respectful of and sensitive to learners.	.445	.374	5.40	5.46	1.292	0.272
17.	I will often utilize teaching and learning aids.	.421	.633	5.25	5.32	0.389	0.542
18.	I will have learners actively involved in my lessons.	.335	.667	5.47	5.55	2.409	0.083
19.	I will use practice and repetition when teaching.	.476	.433	5.08	5.27	0.043	0.839
22.	Teaching is simple.	.491	.366	5.25	5.25	4.695	0.046
25.	I should often have opportunities to practice my teaching.	.369	.558	5.09	5.29	1.531	0.234
32.	I am very sensitive to the need to motivate learners.	.303	.553	5.37	5.35	0.186	0.672
33.	I will adjust my objectives and methods to situations that arise in my classes.	.319	.477	5.37	5.35	0.035	0.854

Table 3

Belief About Outcomes

MANOVA ON ATTITUDE SS AS UNIT (NO SEC)-ELIMINATE EXP2 GP1,
EXP1GP3S6,EXP1GP5S6,EXP2GP2S6,EXP2GP3S6,CON2GP1S6
Factor II: 5,6,12,20 FROM 4 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 through 1	1.867	4.000	13.000	0.176	0.604

		factor loadings		t-test			
		pretest	posttest	pretest	posttest	F	p-level
5.	I do not have good insight into myself as a teacher.	.444	.318	4.55	4.89	2.689	0.121
6.	I do not know the demands and difficulties of teaching.	.545	.363	4.53	4.75	4.943	0.041
12.	I know my teaching strengths and weaknesses.	.636	.390	3.79	4.17	0.010	0.921
20.	I don't know very much about teaching and learning.	.581	.445	4.51	5.00	0.567	0.462

Table 4

Me As A Teacher

MANOVA ON SD-ME AS A TEACHER SUBJECTS AS UNIT (NO SEC)-ELIMINATE EXP2GP1,EXP1GP3S6,EXP1GP5S6,EXP2GP2S6,EXP2GP3S6,CON2GP1S6.
FACTOR II: 2,4,13 FROM 3 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 through 1	1.977	3.000	14.000	0.164	0.545

		factor loadings		t-test			
		pretest	posttest	pretest	posttest	F	p-level
2.	not committed...committed	.486	.608	5.18	5.21	1.363	0.260
5.	enthusiastic...not enthusiastic	.381	.655	5.35	5.51	0.249	0.625
13.	not involved...involved	.620	.455	5.44	5.52	5.720	0.029

Table 5

Practice Teaching

MANOVA ON SD-PRACTICE TEACHING SUBJECTS AS UNIT (NO SEC)-ELIMINATE
EXP2GP1,EXP1GP3S6,EXP1GP5S6,EXP2GP2S6,EXP2GP3S6,CON2GP1S6.
FACTOR 1: 3,6,8 FROM 3 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 THROUGH 1	4.188	3.000	14.000	0.026	0.688

	factor loadings		t-test			
	pretest	posttest	pretest	posttest	F	p-level
3. not frightening...frightening	.536	.711	3.41	3.76	0.342	0.567
6. not confident about...confident about	.834	.770	4.58	4.95	2.439	0.138
8. anxious about...not anxious about	.344	.368	2.68	2.78	5.690	0.030

Table 6

Practice Teaching

MANOVA ON SD-PRACTICE TEACHING SUBJECTS AS UNIT (NO SEC)-ELIMINATE EXP2GP1,EXP1GP3S6,EXP1GP5S6,EXP2GP5S6,EXP2GP3S6,CON2GP1S6.
FACTOR III: 1,7 FROM 3 FACTOR SOLUTION

MULTIVARIATE TESTS OF SIGNIFICANCE USING WILKS LAMBDA CRITERION

TEST OF ROOTS	F	DFHYP	DFERR	P LESS THAN	R
1 THROUGH 1	2.632	2.000	15.000	0.105	0.510

	factor loadings		t-test			
	pretest	posttest	pretest	posttest	F	p-level
1. important...unimportant	.700	.703	5.65	5.65	0.810	0.381
7. valuable...useless	.756	.839	5.57	5.50	4.563	0.048